

An ornithological survey in north-east India

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We conducted surveys between October 2000 and June 2001 at nine sites in north-east India with low- to mid-elevation tropical evergreen forest, with a particular focus on forest species. We recorded 261 bird species, including five globally threatened species (White-winged Duck *Cairina scutulata*, Rufous-necked Hornbill *Aceros nipalensis*, Pallas's Fish Eagle *Haliaeetus leucoryphus*, Lesser Adjutant *Leptoptilos javanicus* and Beautiful Nuthatch *Sitta formosa*), four Near Threatened species (White-cheeked Partridge *Arborophila atrogularis*, Great Hornbill *Buceros bicornis*, Brown Hornbill *Anorrhinus tickelli* and Blyth's Kingfisher *Alcedo hercules*), three restricted-range species, several poorly known species, and a number of new altitudinal records. In general, north-east India remains deficient in avifaunal data. Further surveys, especially in the poorly known interior montane tracts, are needed to assist the identification of conservation priorities in the region.

INTRODUCTION

Owing to its unique position at the confluence of the Indo-Malayan, Indo-Chinese and Indian biogeographic regions, and to its varied physiography, north-east India harbours a range of habitats, with a highly diverse and endemic biota (Mani 1974). The region's lowland and submontane moist to wet tropical evergreen forests are considered by some to be the northernmost limit of true tropical rainforests in the world (Procter *et al.* 1998). North-east India probably supports the highest bird diversity in the Orient, with about 836 of the c.1,200 bird species known from the Indian subcontinent. The richness of the region's avifauna largely reflects the diversity of habitats associated with a wide altitudinal range. The global distributions of 24 species are restricted to the region, and the Eastern Himalayas and Assam Plains are recognised as Endemic Bird Areas (ICBP 1992).

Although the biological importance of north-east India is recognised, the region remains deficient in baseline, area-specific biological data (van Dijk *et al.* 1999). Avifaunal surveys in the region date back to the end of the 19th century (Ali and Ripley 1987), but there was little subsequent ornithological activity until the last decade or so (Katti *et al.* 1992, Singh 1995, Athreya *et al.* 1997, Datta *et al.* 1998, Raman *et al.* 1998, Kumar and Singh 1999, Choudhury 2000, Raman 2001). Recent work has been mostly restricted to parts of Assam and Arunachal Pradesh.

We conducted bird surveys in nine low- to mid-elevation submontane sites in north-east India between October 2000 and June 2001. We also include information on Ngengpui Wildlife Sanctuary, Mizoram, from observations made by SP during 1998–1999.

STUDY SITES

Nameri National Park (200 km²) and **Pakhui Tiger Reserve** (862 km²) are located in the outer range of the Himalayas, at the junction of the western end of Arunachal Pradesh and north-western Assam. The two protected areas are bounded by the fast-flowing Bhareli river and its tributary the Pakke (known as the Bordikarai after the Dimbru river joins it). Mean

annual rainfall is 2,506 mm, and the vegetation is a mosaic of tropical semi-evergreen and evergreen forest, with subtropical broadleaved forest at higher altitudes (Datta 2001). The forests are rich in epiphytes, lianas, and creepers, with cane-brakes and small patches of clump-forming bamboo (*Dendrocalamus* sp.) occurring along streams. The lower fringes of Pakhui TR and many parts of Nameri National Park (NP) were logged up until the early 1980s, when they were declared as protected areas. The logged forest is distinctive in its lack of canopy emergents and the presence of dense undergrowth. Some areas of Nameri NP, presumably where heavy extraction occurred, are now open habitat



Figure 1. Map showing location of study sites.

with grassy clearings or covered with bushes and a few remnant forest trees. The forest is more contiguous in Pakhui Tiger Reserve (TR), except for disturbed patches in the accessible foothills and in areas adjoining rivers. Strips of tall grassland occur along the plains of the Bhareli river and its larger tributaries, adding to the diversity of habitats in the area.

Namdapha Tiger Reserve is a large park (1,985 km²) situated in the Changlang district of Arunachal Pradesh, sandwiched between the east Himalayan and Patkai ranges, where the Himalayan arc curves southwards. The area receives c.2,500 mm of rainfall annually, and the low to mid-altitudes of the reserve consist of large tracts of tropical evergreen and semi-evergreen forests, continuing into subtropical and temperate habitats towards the upper reaches. The forest appears contiguous in many areas, only punctuated by small hilltop ponds (e.g. Rani and Moti Jheel), marshes centred on mineral springs (e.g. Chidya Pung and Bulbulia), and natural tree-fall gaps. The forest is relatively patchy and stunted on unstable slopes and along larger drainages. Clump-forming (sympodial) bamboo, palms, canes, wild banana, and *Colocasia* sp. are abundant in patches and along streams. Stretches of grassland are found on the plains at river junctions and along the lower Noa Dihing river.

Mouling National Park (483 km²) is located in the Upper Siang district of Arunachal Pradesh, in the Adi Hills of the east Himalayas adjoining the Siang river valley. The Siang river is an imposing feature in the landscape, and carves deeply through high, rugged mountains (which peak at 4,593 m) creating a valley as low as 300 m in the vicinity of the park. The steep valley slopes are well drained by a number of fast-flowing streams. The area is extremely humid, with high rainfall (2,343 mm annually) and no well-defined dry season. As it cuts so low into the mountains, the Siang valley ‘carries’ wet tropical conditions further north than in most areas in the Himalayas, facilitating dispersal of lowland tropical elements along it. The low to middle altitudes in the valley, and along the tributaries of the main river, are dominated by tropical wet

evergreen and semi-evergreen forests, tending towards wet subtropical broad-leaved and temperate forest at the upper reaches. The vegetation along streams is moist and luxuriant, with moss-laden trunks and branches. Patches of canes and wild bananas abound, especially along streams. Much of the protected area supports undisturbed primary forest, albeit with some disturbance at the fringes, mainly in the form of cane extraction.

Balphakram National Park (353 km²) is located at the south-east end of the Garo Hills of Meghalaya, bordering the west Khasi Hills. These hill ranges have many unique physiographic and biological characteristics, much of which can be attributed to their being much older than the east Himalayas and other north-east Indian hills (Krishnan 1982). Extensive karstic limestone formations are an interesting feature of the Garo Hills, and may be the main reason for the area’s surprisingly dry appearance, despite its location in one of the world’s wettest belts (often >10,000 mm per year in areas of the neighbouring Khasi Hills; Pawar and Birand 2001). The area receives around 3,293 mm rainfall annually, and the moist, semi-evergreen and tropical evergreen forests in the national park are largely confined to a single contiguous tract. This forest is tall (>35 m) in places, and mostly has a clear understorey. Canes and palms are sparsely distributed in the primary forest, but are concentrated mainly along streams. Surrounding this tract of moist forest are small patches of semi-evergreen forest, giving way to deciduous forest further towards the periphery. The Balphakram plateau (c.700 ha) is dominated by grassland scattered with stunted trees.

Barail Reserve Forest (c.100 km²) lies at the southwestern end of the Barail Range, adjoining the Jatinga valley, in southern Assam. This end of the range, though not as lofty as the main range, is steep in places and forms the catchment of the Jatinga river. The area receives high rainfall (3,107 mm annually) and the primary vegetation is tropical semi-evergreen to moist evergreen forest. The moist forest lies along steep ravines, and the undisturbed riparian patches are rich

Table 1. Details of study sites.

Site	Coordinates	Dates	Localities surveyed	Altitude (m)
Nameri NP (Assam) and Pakhui TR (Arunachal Pradesh)	26°57'N 92°26'E	24/10/00– 25/11/00	Eco-camp, Potasoli, Watchtower, Balipung Nala, Sejosa Bhagijoli, July Bhasti, Tipi	80–250
Namdapha TR (Arunachal Pradesh)	27°31'N 96°36'E	05/01/01– 25/01/01	Deban, Gibbon’s Land, Haldibari, Hornbill, Bulbulia, Firmbase, 32nd mile, Moti Jheel	200–750
Mouling NP (Arunachal Pradesh)	28°35'N 94°56'E	29/01/01– 24/02/01	Jengging, Ramsing, and Bomdo villages, Sirinyuk Nala, Yingkiong, Siring Nala, Bomdo camp, Runyo	600–1,700
Balphakram NP (Meghalaya)	25°33'N 90°33'E	15/03/01– 28/03/01	Hathi gate, Helipad, Rompa Chiring, Kundulgop	250–350
Barail RF (Assam)	25°24'N 92°51'E	05/04/01– 15/04/01	Ditoksura forest check gate, Dimbru-disa village, Jianga Nala, Dimbru Nala, NJ hill	250–450
Ngengpui WLS and Palak Lake (Mizoram)	22°05'N 92°47'E	25/04/01– 14/05/01	Ngengpui, Khawmawi, Bungtlang, Kawrthindeng and Phura villages, Palak Lake, Kolodyne river	170–300
Dampa TR (Mizoram)	23°33'N 92°22'E	21/05/01– 31/05/01	Terei, Terei Path, Dampa Tlang, Pathlawi Lunglen Tlang, Tuichar Puk Kai, Tuichar Lui	250–950

in palms and canes. Although degraded along the western and northern fringes that we surveyed, the forest on the inner hills of the reserve appears more contiguous and relatively undisturbed. The forest understorey is cleared for betel-vine plantations in some places. Most of the accessible forest along fringes of the reserve has been subjected to heavy cane and palm extraction.

Ngengpui Wildlife Sanctuary (110 km²) and **Palak Lake** (c.30 km²) are situated in south-western Mizoram (Pachau 1994). To the west are the Chittagong Hills of Bangladesh, and to the east are Chin Hills. Ngengpui Wildlife Sanctuary (WLS) lies in the valley of the Ngengpui river, which joins the Kolodnye in the south. Palak Lake, c.200 m long and 150 m wide, is situated c.20 km south-east of the Ngengpui river valley, at an altitude of c.300 m. The lake is surrounded by undulating, moderately steep hills, and the general topography and microclimate is similar to that of the Ngengpui river valley. The area receives c.2,542 mm of rainfall annually. Both areas have dipterocarp-dominated tropical semi-evergreen to moist evergreen forest, which is rich in palms, canes and rattans, with dense cane-brakes often encountered on plains. Narrow strips of tall grassland exist along larger rivers. Most of Ngengpui WLS is contiguous primary forest, punctuated by small, low-lying, forest-bound marshes, tree-fall gaps and bamboo clusters. The Palak Lake area is more fragmented and degraded. A belt of disturbed primary forest encircles the lake, while many of the nearby hills (especially on the western side) are covered by 'jhum' (shifting agriculture fields) and bamboo brakes. The forest follows the Palak stream, which originates from the eastern side of the lake, down to where the gorge opens in the shallow valley where Phura village is situated.

Dampa Tiger Reserve, the largest of the protected areas in Mizoram (500 km²), is situated at the western limit of the state. The area lies in the Lushai Hills, a series of parallel north-south ranges allied to the Arakan Yoma arc. To the west are the Chittagong Hill tracts of Bangladesh. The hills at the eastern limit of this landscape are much higher, continuing further east to the Chin Hills of Myanmar. The area receives c.2,155 mm rainfall annually, and the natural vegetation in the reserve is tropical evergreen to semi-evergreen. The forest in the moist valleys is tall and evergreen, while the steeper slopes to the west have more deciduous elements, often with sympodial bamboos in the understorey. Strips of tall grassland flank the lower reaches of the Teirei river where the forest does not abut the river directly.

METHODS

At all sites we spent most time in primary forest, and much less in disturbed forest patches and secondary habitats such as bamboo brakes and jhum fallows and plantations. We carried out diurnal, crepuscular and nocturnal surveys. For each sighting we took notes on locality, altitude, microhabitat, behaviour and, when appropriate, identification. Calls were recorded with a

cassette recorder whenever possible. In addition, we showed pictures of birds to local hunters to obtain additional information. To familiarise ourselves with the region's avifauna, we spent most time at the first site (Nameri NP and Pakhui TR).

SIGNIFICANT RECORDS

We recorded 261 bird species, about one-third of the total known from the region (see Appendix). These included one Endangered, four Vulnerable and four Near Threatened species (BirdLife International 2004), and three restricted-range species (Stattersfield *et al.* 1998). Details are provided below of records of these and other poorly known species.

WHITE-CHEEKED PARTRIDGE *Arborophila atrogularis* (Near Threatened)

Locally common in north-east India (Grimmett *et al.* 1999). Two individuals were heard calling in primary forest at 565 m at Hornbill camp, Namdapha TR, on 14 January 2001. Another individual was heard in a patch of moderately disturbed primary forest at 230 m in Kawrthindeng village, Ngengpui WLS, on 9 May 2001.

WHITE-WINGED DUCK *Cairina scutulata* (Endangered) Formerly common and widespread in north-east India, but now reduced to fragmented populations in Assam and Arunachal Pradesh (Grimmett *et al.* 1999). A male and female were seen on a small pond in a dry river bed at c.100 m, north of Potasoli forest camp, Nameri NP, on 27 October 2000. Another pair was flushed at c.100 m from a shady stream surrounded by disturbed forest at Balipung Nala, Nameri NP, on 30 October 2000.

GREAT HORNBILL *Buceros bicornis* (Near Threatened) This species was seen between November and January, mostly in pairs, in Nameri NP, Pakhui WLS and Namdapha TR, where it appears to be locally common. Elsewhere it was rare: three lone individuals in Balphakram NP (16–23 March 2001); one heard at c.600 m in a moderately disturbed patch of primary forest in Barail RF (8 April 2001); one at c.600 m flying over a mosaic of bamboo patches and fragmented forest at Bungtlang village, Ngengpui WLS (7 May 2001); and five lone individuals flying over undisturbed primary forest at c.400 m in Dampa TR (27–30 May 2001). SP also had a few additional sightings in Ngengpui WLS between December 1998 and April 1999.

BROWN HORNBILL *Anorrhinus tickelli* (Near Threatened)

Reported from eastern Assam, Namdapha TR and the Barail Range (Singh 1995, Choudhury 2000), but apparently rare in these areas. One pair was sighted at the edge of a small patch of forest surrounded by abandoned jhum fields and bamboo brakes at c.300 m, c.4–5 km from Dimbru Disa village, Barail RF, on 13 Apr 2001.

RUFIOUS-NECKED HORNBILL *Aceros nipalensis*
(Vulnerable)

All sightings of this species were from Namdapha TR, where it appears to be locally common, despite being rare elsewhere in north-east India. Four pairs were seen, and calls heard on two different occasions, on the Haldibari–Hornbill–Bulbulia track at 450–650 m on 13–16 January 2001. A further pair was seen feeding on the fruits of a *Canarium* sp. at 410 m on 8 January 2001.

WREATHED HORNBILL *Aceros undulatus*

This species was seen frequently in Nameri NP and Pakhui WLS, mostly in threes and fours. Within Pakhui WLS, it roosts communally with Great Hornbill in scattered trees in riparian grassland at c.100 m near Seijusa: on 9 November 2000, 82 individuals were recorded at this roost. The species was seen and heard frequently throughout Namdapha TR. Elsewhere, it was heard only once, at c.450 m in undisturbed primary forest at Tuichar Lui, Dampa TR, on 28 May 2001. Skulls and bills of the species were seen in villages near Ngengpui WLS, suggesting that it may occur there.

BLYTH'S KINGFISHER *Alcedo hercules* (Near Threatened)

Generally rare, but probably locally common in Namdapha TR (Athreya *et al.* 1997). A pair was heard calling at c.300 m at Laungka Nala, Namdapha TR, on 21 January 2001.

BLACK-CAPPED KINGFISHER *Halcyon pileata*

Primarily a coastal species, but known to move inland along large rivers (Ali and Ripley 1987). One individual was sighted on a tree in the middle of paddy fields, at 240 m near Phura village, Palak Lake, on 29 April 2001. This record was of interest because the locality was c.120 km inland from the coast, with no large rivers, just some streams, in the vicinity.

EURASIAN CUCKOO *Cuculus canorus*

Summer visitor, probably breeding in the region (Ali and Ripley 1987). A single female was seen at 490 m in Barail RF, in moderately disturbed primary forest, on 12 April 2001.

ASHY WOOD PIGEON *Columba pulchricollis*

A flock of 20–30 individuals was seen on the Hornbill–Bulbulia track in undisturbed forest in Namdapha TR, at c.650 m on 14 January 2001. Three individuals were also seen at Ditekchorra forest check gate, Barail RF, at c.280 m on 8 April 2001.

PALLAS'S FISH EAGLE *Haliaeetus leucorhynchus*
(Vulnerable)

An adult was seen circling over the Bhareli river at Potasoli camp, Nameri NP, on 31 October 2000. On 1 November 2001, two adults and a juvenile were seen circling at the same site.

AMUR FALCON *Falco amurensis*

Rare passage migrant, possibly breeding in southern Assam (Ali and Ripley 1987). More than 25 individuals were seen circling above the range office, Nameri

NP, on 24 October 2000. This area is believed to be on one of the species's main migratory routes (Choudhury 2000).

LESSER ADJUTANT *Leptoptilos javanicus* (Vulnerable)

One individual was seen perched in a bare tree near a dry river bed north of Potasoli camp, Nameri NP, at c.100 m on 30 October 2000. On 3 November 2000, a pair was seen circling over the same area. A lone individual was seen foraging in water puddles created by elephant tracks at c.100 m on Bogijoli path, Nameri NP, on 14 November 2000.

BLUE-NAPE PITTA *Pitta nipalensis*

This species was seen by SP in Ngengpui WLS and surrounding areas between December 1998 and April 1999. Not uncommon in the forested area, but although calls were often heard, the species was not seen easily, owing to its secretive understorey habits. A local hunter was seen with one specimen. In late March 1999, a female with 3–4 chicks was encountered in primary forest. The female fled and presumably hid nearby, after making a short series of alarm calls. The chicks, which were still covered with down, immediately crouched among the leaf litter.

HOODED PITTA *Pitta sordida*

Summer visitor or resident (Grimmett *et al.* 1999). This species was apparently quite common in the forest around Palak Lake, with six sightings between 29 April and 3 May 2001, including three individuals in one day. Calls were also heard during the day on a few occasions. Individuals were reluctant to fly unless approached very close, at which point they made short flights and perched on low (<0.5 m) branches and lianas.

LONG-TAILED THRUSH *Zoothera dixonii*

One individual was seen at 1,480 m near Runyo ridge, at Ogiyong Gobu camp, Mouling NP, on 17 February 2001. The species was seen on three more occasions on the same path (at 1,555 m and on the way back), but these sightings could relate to the same individual.

[GOULD'S SHORTWING *Brachypteryx stellata*]

A *Brachypteryx* sp. was observed for ten minutes in the dense understorey of a patch of secondary forest near a small stream at c.750 m in Mouling NP (Sirinyuk trail) on 4 February 2001. It had uniform grey underparts, with pale spotting or streaking on the flanks; the wings were bright chestnut; the iris was yellowish in colour. We tentatively identified this species as Gould's Shortwing, but noted that the crown, mantle and tail appeared grey rather than chestnut. The call was a series of high-pitched notes terminating in a piercing *seeet*. The locality is unusually low for Gould's Shortwing, although a specimen of this species was collected at 540 m in Sikkim (Ali and Ripley 1987).

ASIAN BROWN FLYCATCHER *Muscicapa dauurica*

One individual was seen at c.300 m in the sparse understorey of an open riparian patch surrounded by jhum fallows and bamboo clumps in Barail RF on 13 April 2001.

BEAUTIFUL NUTHATCH *Sitta formosa* (Vulnerable)

Four individuals were seen foraging in a bare tree at Ogiyong Gabu camp, Mouling NP, at c.1,400 m on 18 February 2001. They were apparently foraging with a mixed-species foraging flock that included Sultan Tit *Melanochlora sultanea*, Orange-bellied Leafbird *Chloropsis hardwickii*, Grey-chinned Minivet *Pericrocotus solaris*, Long-tailed Sibia *Heterophasia picaoides* and White-browed Shrike Babbler *Pteruthius flaviscapis*.

YELLOW-VENTED WARBLER *Phylloscopus cantator* (Restricted-range)

This species was always seen in mixed-species foraging flocks of small insectivores: three sightings in Nameri NP and Pakhui WLS (Sejusa and Tipi) at 100–200 m on 8–24 November 2001; one at Moti Jheel, Namdapha TR, at c.400 m on 24 January 2001; one at Narong Chiring, Balphakram NP, at c.350 m on 26 March 2001; and one in Barail RF at 665 m on 12 April 2001.

LARGE SCIMITAR BABBLER *Pomatorhinus hypoleucos*

This species was recorded twice by SP near Kawrthindeng village, Ngengpui WLS, in February 1999. The first record was an unconfirmed sighting of an individual seen briefly in the upper understorey of a stand of bamboo (*Melocanna* sp., *Bambusa tulda* and *Dendrocalamus longispathus*) and woody vegetation. The second record was of an adult shot by a local hunter in a mature bamboo stand in the same area.

SPOT-BREASTED SCIMITAR BABBLER *Pomatorhinus erythrocnemis*

At least two to three individuals of this species were seen in a mixed-species flock with necklaced laughingthrushes *Garrulax* sp. in disturbed primary forest at 300 m by Palak Lake on 2 May 2001. A flock of around ten individuals was also seen at Kawrthindeng village, Ngengpui WLS, on 9 May 2001 in moderately disturbed primary forest at 230 m. These may represent the lowest altitudinal records for the species.

WHITE-NAPED YUHINA *Yuhina bakeri* (Restricted-range)

This species was seen only in Mouling NP, where it was apparently the most common *Yuhina* sp. Recorded during February 2001, between 800–1,470 m, mostly in single-species flocks of c.20 individuals, or occasionally in mixed-species flocks with Whiskered Yuhina *Y. flavicollis* and Nepal Fulvetta *Alcippe nipalensis*.

BEAUTIFUL SIBIA *Heterophasia pulchella* (Restricted-range)

A flock of c.10–15 individuals was seen at Ogiyong Gobu camp, Mouling NP, at 1,215 m on 17 February 2001, foraging silently among foliage just below the canopy of a stunted riparian patch. The following day, a flock (possibly the same) was seen in the same area.

SCARLET-BACKED FLOWERPECKER *Dicaeum cruentatum*

One or two males seen on three occasions at c.300 m in Balphakram NP on 15–16 March 2001. The only other record was from Tuichar Lui, Dampa TR, where a single male was seen in undisturbed primary forest at 400 m on 30 May 2001.

[RED CROSSBILL *Loxia curvirostra*]

Several individuals were tentatively identified among a flock of Scarlet Finches *Haematospiza sipahi* foraging in shrubby secondary growth at 650 m at Ramsing near Mouling NP on 13 February 2001. The flock of 12–15 birds contained 2–3 male and 5–6 female Scarlet Finches, plus 2–4 female-type birds with crossed beaks. The crossed beaks were very pronounced, and noticeable even without binoculars. The sighting was well below the lowest record for this species in the region: 1,500 m in Sikkim (Ali and Ripley 1987), but the Siang river cuts deep through the inner Himalayas, leading to tropical forest at low altitudes in the lower valley occurring in close proximity with habitats typical of much higher altitudes in the region.

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REFERENCES

- Ali, S. and Ripley, S. D. (1987) *Compact handbook of the birds of India and Pakistan*. Delhi: Oxford University Press.
- Athreya, R. M., Captain, A. S. and Athreya, V. R. (1997) A faunal survey of Namdapha Tiger Reserve, Arunachal Pradesh, India. Unpublished report.
- BirdLife International (2004) *Threatened birds of the world 2004*. CD-ROM. Cambridge, U.K.: BirdLife International.
- Choudhury, A. (2000) *The birds of Assam*. Guwahati, India: Gibbon Books and WWF-India.
- Datta, A. (2001) An ecological study of sympatric hornbills and fruiting patterns in a tropical forest in Arunachal Pradesh. Ph.D thesis, Saurashtra University, Rajkot.
- Datta, A., Singh, P., Athreya, R. M. and Karthikeyan, S. (1998) Birds of Pakhui Wildlife Sanctuary in western Arunachal Pradesh. *Newsletter for Birdwatchers* 38: 91–96.
- van Dijk, P. P., Ashton, P. and Jinshuang, M. (1999) Indo-Burma. Pp. 319–337 in R. A. Mittermeier *et al.*, eds. *Hotspots: earth's biologically richest and most endangered terrestrial ecoregions*. Mexico City: Cemex and Conservation International.
- Grimmett, R., Inskipp, C. and Inskipp, T. (1999) *A guide to the birds of India, Pakistan, Nepal, Bangladesh, Bhutan, Sri Lanka, and the Maldives*. Princeton, New Jersey: Princeton University Press.
- ICBP (1992) *Putting biodiversity on the map: priority areas for global conservation*. Cambridge, U.K.: International Council for Bird Preservation.
- Katti, M., Singh, P., Manjrekar, N., Sharma, D. and Mukherjee, S. (1992) An ornithological survey in eastern Arunachal Pradesh. *Forktail* 7: 75–89.
- Krishnan, M. S. (1982) *Geology of India and Burma*. Delhi: CBS Publishers and Distributors.

Kumar, S. and Singh, P. (1999) *A study on pheasant distributions in Arunachal Pradesh, Eastern Himalaya, India*. Dehradun: Wildlife Institute of India.

Mani, M. S. (1974) *Ecology and biogeography in India*. The Hague: Junk.

Pachua, R. (1994) *Geography of Mizoram*. Aizawl: R. T. Enterprise.

Pawar, S. and Birand, A. (2001) *A survey of amphibians, reptiles, and birds in Northeast India*. Mysore: Centre for Ecological Research and Conservation.

Procter, K. H., Haridasan, K. and Smith, G. W. (1998) How far does lowland tropical rainforest go? *Global Ecol. Biogeogr.* 7: 141–146.

Raman, T. R. S. (2001) Effect of slash-and-burn shifting cultivation on rainforest birds in Mizoram, Northeast India. *Conserv. Biol.* 15: 685–698.

Raman, T. R. S., Rawat, G. S. and Johnsingh, A. J. T. (1998) Recovery of tropical rainforest avifauna in relation to vegetation succession following shifting cultivation in Mizoram, north-east India. *J. App. Ecol.* 35: 214–231.

Singh, P. (1995) Recent bird records from Arunachal Pradesh. *Forktail* 10: 65–104.

Stattersfield, A. J., Crosby, M. J., Long, A. J. and Wege, D. C. (1998) *Endemic Bird Areas of the world: priorities for biodiversity conservation*. Cambridge, U.K.: BirdLife International.

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APPENDIX
Checklist of birds recorded from study sites

Species	Habitat	NP	NA	MO	BL	BR	PA	NG	DA
RUFIOUS-THROATED PARTRIDGE <i>Arborophila rufogularis</i>	1A, 2A			x					
WHITE-CHEEKED PARTRIDGE <i>Arborophila atrogularis</i>	1A		x					x	
RED JUNGLEFOWL <i>Gallus gallus</i>	1B, 1C, 2A, 2B, 2D, 3B, 4	x		x	x	x		x	
KALIJ PHEASANT <i>Lophura leucomelanos</i>	1A, 1B, 1C, 2A, 2B, 4	x			x	x	x	x	x
GREY PEACOCK PHEASANT <i>Polyplectron bicalcaratum</i>	1A, 1B, 2A, 2B, 3A		x		x	x	x	x	x
LESSER WHISTLING-DUCK <i>Dendrocygna javanica</i>	5							x	
WHITE-WINGED DUCK <i>Cairina scutulata</i>	1C, 5	x							
COMMON MERGANSER <i>Mergus merganser</i>	5	x	x						
SPECKLED PICULET <i>Picumnus innominatus</i>	1A, 2D, 3B, 3F							x	x
WHITE-BROWED PICULET <i>Sasia ochracea</i>	1B, 2A, 2D, 3A			x	x	x	x		x
GREY-CAPPED PYGMY WOODPECKER <i>Dendrocopos canicapillus</i>	1C	x							
FULVOUS-BREASTED WOODPECKER <i>Dendrocopos macei</i>	2A, 2B, 3A	x		x	x				
RUFIOUS WOODPECKER <i>Ceolus brachyurus</i>	1B, 4					x	x		
PALE-HEADED WOODPECKER <i>Gecinulus grantia</i>	2D					x			
BAY WOODPECKER <i>Blythipicus pyrrhotis</i>	1A, 1B, 1C, 2A, 2B, 4	x	x	x	x	x	x		x
GREAT SLATY WOODPECKER <i>Mulleripicus pulverulentus</i>	1B		x			x		x	
LESSER YELLOWNAPE <i>Picus chlorolophus</i>	1B, 1C, 2A, 3A	x		x		x		x	
GREATER YELLOWNAPE <i>Picus flavinucha</i>	1A, 1B, 1C, 3A	x	x	x	x	x	x	x	x
GREY-HEADED WOODPECKER <i>Picus canus</i>	1A, 1C, 2B, 2D, 4	x	x		x	x			
GREATER FLAMEBACK <i>Chrysocolaptes lucidus</i>	1B, 1C, 2B, 3A, 3D	x	x		x		x	x	x
GREAT BARBET <i>Megalaima virens</i>	1A, 1B, 1C, 2A, 2B	x	x	x	x	x	x	x	x
LINEATED BARBET <i>Megalaima lineata</i>	1C, 2A, 2B, 3A	x			x	x		x	
BLUE-THROATED BARBET <i>Megalaima asiatica</i>	1A, 1B, 1C, 2A, 2B, 3A	x	x	x	x	x	x	x	x
COPPERSMITH BARBET <i>Megalaima haemacephala</i>	3A, 3E	x				x			
ORIENTAL PIED HORNBILL <i>Anthracoceros albirostris</i>	1A, 1B, 1C, 2B, 2C, 3A	x	x		x	x	x	x	x
GREAT HORNBILL <i>Buceros bicornis</i>	1A, 1B, 1C, 2A, 3A	x	x		x	x		x	x
BROWN HORNBILL <i>Anorrhinus tickelli</i>	1C, 3D					x			
RUFIOUS-NECKED HORNBILL <i>Aceros nipalensis</i>	1A, 1B		x						
WREATHED HORNBILL <i>Aceros undulatus</i>	1A, 1B, 1C	x	x					x	x
COMMON HOOPOE <i>Upupa epops</i>	2B, 3A	x			x				
RED-HEADED TROGON <i>Harpactes erythrocephalus</i>	1A, 1B, 1C		x	x	x	x	x	x	x
INDIAN ROLLER <i>Coracias benghalensis</i>	3A, 3D	x					x	x	
DOLLARBIRD <i>Eurystomus orientalis</i>	3A, 3D	x					x	x	
BLYTH'S KINGFISHER <i>Alcedo hercules</i>	1A		x						
ORIENTAL DWARF KINGFISHER <i>Ceyx erithacus</i>	1A, 1B, 2C							x	
WHITE-THROATED KINGFISHER <i>Halycon smyrnensis</i>	3A, 3D	x					x	x	
BLACK-CAPPED KINGFISHER <i>Halycon pileata</i>	3D						x		
CRESTED KINGFISHER <i>Megaceryle lugubris</i>	5	x	x						
BLUE-BEARDED BEE-EATER <i>Nyctornis athertoni</i>	1B, 1C, 3A	x	x				x	x	

Species	Habitat	NP	NA	MO	BL	BR	PA	NG	DA
CHESTNUT-HEADED BEE-EATER <i>Merops leschenaulti</i>	3A	x							
CHESTNUT-WINGED CUCKOO <i>Clamator coromandus</i>	1B						x		
EURASIAN CUCKOO <i>Cuculus canorus</i>	1C					x			
INDIAN CUCKOO <i>Cuculus micropterus</i>	1B, 2C						x	x	x
VIOLET CUCKOO <i>Chrysococcyx xanthorhynchus</i>	1B						x		
DRONGO CUCKOO <i>Surniculus lugubris</i>	1B, 1C, 3A	x	x				x	x	
GREEN-BILLED MALKOHA <i>Phaenicophaeus tristis</i>	1B, 1C, 2B, 3A	x	x		x		x	x	
GREATER COUCAL <i>Centropus sinensis</i>	3F							x	
VERNAL HANGING PARROT <i>Loriculus vernalis</i>	1A, 1C	x						x	
RED-BREASTED PARAKEET <i>Psittacula alexandri</i>	3A	x							
HIMALAYAN SWIFTLET <i>Collocalia brevirostris</i>	5			x					
MOUNTAIN SCOPS OWL <i>Otus spilocephalus</i>	2A			x				x	
COLLARED OWLET <i>Glaucidium brodiei</i>	1A, 1B, 2A		x	x			x	x	
ASIAN BARRED OWLET <i>Glaucidium cuculoides</i>	1A, 1B, 1C, 2A, 2C, 3E	x	x	x	x	x	x	x	x
GREAT EARED NIGHTJAR <i>Eurostopodus macrotis</i>	1B, 2C						x	x	
LARGE-TAILED NIGHTJAR <i>Caprimulgus macrurus</i>	1A, 1B, 2B				x		x	x	
ASHY WOOD PIGEON <i>Columba pulchricollis</i>	1A, 3A		x			x			
GREEN IMPERIAL PIGEON <i>Ducula aenea</i>	3A	x							
MOUNTAIN IMPERIAL PIGEON <i>Ducula badia</i>	1A, 1B, 1C, 3A	x	x			x	x	x	x
ORIENTAL TURTLE DOVE <i>Streptopelia orientalis</i>	1C, 2B, 3A, 3F	x		x	x				
SPOTTED DOVE <i>Streptopelia chinensis</i>	3A, 3D, 3E	x	x				x	x	
EMERALD DOVE <i>Chalcophaps indica</i>	1B, 1C, 2B, 3A, 3B	x			x	x	x	x	x
POMPADOUR GREEN PIGEON <i>Treron pompadora</i>	1C, 3A	x		x			x		
PIN-TAILED GREEN PIGEON <i>Treron apicauda</i>	1A, 1B, 1C, 2B, 3A	x	x	x	x			x	
WEDGE-TAILED GREEN PIGEON <i>Treron sphenura</i>	2B				x				
COMMON MOORHEN <i>Gallinula chloropus</i>	5						x		
RIVER LAPWING <i>Vanellus duvaucelii</i>	5		x						
RED-WATTLED LAPWING <i>Vanellus indicus</i>	5	x							
BLACK BAZA <i>Aviceda leuphotes</i>	1B, 2B, 5		x		x			x	
PALLAS'S FISH EAGLE <i>Haliaeetus leucoryphus</i>	5	x							
CRESTED SERPENT EAGLE <i>Spilornis cheela</i>	2A, 2B, 2C, 3D, 3F, 5	x	x	x	x	x	x	x	x
BLACK EAGLE <i>Ictinaetus malayensis</i>	1A, 2A, 3A, 5			x				x	
HEN HARRIER <i>Circus cyaneus</i>	5				x				
CHANGEABLE HAWK EAGLE <i>Spizaetus cirrhatus</i>		x	x						
PIED FALCONET <i>Microhierax melanoleucos</i>	3A, 3B, 4	x				x		x	
COMMON KESTREL <i>Falco tinnunculus</i>	3A, 3D, 5	x			x	x			
AMUR FALCON <i>Falco amurensis</i>	5	x							
DARTER <i>Anhinga melanogaster</i>	5						x		
GREAT CORMORANT <i>Phalacrocorax carbo</i>	5	x	x						
LITTLE EGRET <i>Egretta garzetta</i>							x		
LITTLE HERON <i>Butorides striatus</i>	5		x						
MALAYAN NIGHT HERON <i>Gorsachius melanolophus</i>	1A, 1B, 2C							x	x
BLACK STORK <i>Ciconia nigra</i>	3F		x						
LESSER ADJUTANT <i>Leptoptilos javanicus</i>	3A, 3F, 5	x							
BLUE-NAPED PITTA <i>Pitta nipalensis</i>	1A							x	
HOODED PITTA <i>Pitta sordida</i>	1A, 1B						x		
SILVER-BREASTED BROADBILL <i>Serilophus lunatus</i>	1A, 1B, 1C, 2A	x	x	x			x	x	
LONG-TAILED BROADBILL <i>Psisomus dalhousiae</i>	1A, 1B, 2A, 2C, 3A	x	x	x	x	x	x	x	x
ASIAN FAIRY BLUEBIRD <i>Irena puella</i>	1A, 1B, 1C, 3A	x			x		x	x	x
BLUE-WINGED LEAFBIRD <i>Chloropsis cochinchinensis</i>	1A, 1C, 2C, 2D, 4	x			x	x		x	x
GOLDEN-FRONTED LEAFBIRD <i>Chloropsis aurifrons</i>	1A, 1C, 2B, 3A, 3D	x	x		x	x	x	x	x
ORANGE-BELLIED LEAFBIRD <i>Chloropsis hardwickii</i>	1A, 1B, 2A, 2D, 3A		x	x			x		x
LONG-TAILED SHRIKE <i>Lanius schach</i>	3							x	
GREY-BACKED SHRIKE <i>Lanius tephronotus</i>	3A	x					x		
RED-BILLED BLUE MAGPIE <i>Urocissa erythrorhyncha</i>									
COMMON GREEN MAGPIE <i>Cissa chinensis</i>	1A, 1B, 2B, 3A	x	x	x	x			x	
RUFIOUS TREEPIE <i>Dendrocitta vagabunda</i>	1C	x							
GREY TREEPIE <i>Dendrocitta formosae</i>	1A, 1B, 1C, 2A	x	x	x					
COLLARED TREEPIE <i>Dendrocitta frontalis</i>	1B, 3A		x						
LARGE-BILLED CROW <i>Corvus macrorhynchos</i>	3			x	x			x	
BLACK-HOODED ORIOLE <i>Oriolus xanthornus</i>	3A, 3B, 3C	x	x			x	x	x	

Species	Habitat	NP	NA	MO	BL	BR	PA	NG	DA
MAROON ORIOLE <i>Oriolus trailii</i>	1A, 1B, 1C, 2A, 2B, 3A	x	x	x	x			x	x
LARGE CUCKOOSHRIKE <i>Coracina macei</i>	2B, 3A	x			x				
BLACK-WINGED CUCKOOSHRIKE <i>Coracina melaschistos</i>	1B, 1C, 3A	x	x						
ROSY MINIVET <i>Pericrocotus roseus</i>	2B				x				
GREY-CHINNED MINIVET <i>Pericrocotus solaris</i>	1A, 1B, 2A		x	x					
LONG-TAILED MINIVET <i>Pericrocotus ethologus</i>	1B, 1C, 2A, 3A	x		x				x	
SHORT-BILLED MINIVET <i>Pericrocotus brevirostris</i>	1B, 1C, 2A, 2B	x	x	x	x				
SCARLET MINIVET <i>Pericrocotus flammeus</i>	1A, 1B, 1C, 2A, 2D, 3D, 4	x	x	x		x	x	x	x
BAR-WINGED FLYCATCHER-SHRIKE <i>Hemipus picatus</i>	2A, 2B, 3A			x	x		x	x	
YELLOW-BELLIED FANTAIL <i>Rhipidura hypoxantha</i>	1A, 1B, 2A, 3A	x	x	x					
WHITE-THROATED FANTAIL <i>Rhipidura albicollis</i>	1A, 1B, 1C, 2A, 3A	x	x	x				x	
BLACK DRONGO <i>Dicrurus macrocercus</i>	2A, 3A	x	x	x			x	x	
ASHY DRONGO <i>Dicrurus leucophaeus</i>	1A, 1C, 2B, 2D	x		x	x	x			
CROW-BILLED DRONGO <i>Dicrurus annectans</i>	1B								x
BRONZED DRONGO <i>Dicrurus aeneus</i>	1A, 1B, 1C	x	x					x	
LESSER RACKET-TAILED DRONGO <i>Dicrurus remifer</i>	1A, 1B, 1C, 2A, 2D, 3A	x	x	x	x	x		x	
SPANGLED DRONGO <i>Dicrurus hottentottus</i>	1B, 1C, 2B, 2D, 3A	x			x	x	x	x	
GREATER RACKET-TAILED DRONGO <i>Dicrurus paradiseus</i>	1A, 1B, 1C, 2B, 3A, 4	x	x		x		x	x	x
BLACK-NAPEd MONARCH <i>Hypothymis azurea</i>	1A, 1C, 2B, 2D, 3A				x	x	x		x
ASIAN PARADISE-FLYCATCHER <i>Terpsiphone paradisi</i>	1A, 1B, 2D				x		x		x
COMMON IORA <i>Aegithina tiphia</i>	1C, 2B, 3A	x			x				
LARGE WOODSHRIKE <i>Tephrodornis gularis</i>	1A, 1B, 1C, 2A	x	x		x				
BROWN DIPPER <i>Cinclus pallasii</i>	5		x	x					
CHESTNUT-BELLIED ROCK THRUSH <i>Monticola rufiventris</i>	2A, 3A			x					
BLUE WHISTLING THRUSH <i>Myophonus caeruleus</i>	1A, 1B, 1C, 3E	x	x		x	x		x	x
ORANGE-HEADED THRUSH <i>Zosterops citrina</i>	1A				x				
LONG-TAILED THRUSH <i>Zosterops dixonii</i>	1A			x					
WHITE-COLLARED BLACKBIRD <i>Turdus albocinctus</i>	1A				x				
WHITE-BROWED SHORTWING <i>Brachypteryx montana</i>	1A				x				
ASIAN BROWN FLYCATCHER <i>Muscicapa dauurica</i>	3A					x			
RUFIOUS-GORGETED FLYCATCHER <i>Ficedula strophilata</i>	1A, 1B, 2A		x	x					
RED-THROATED FLYCATCHER <i>Ficedula parva</i>	3A, 3E, 4	x				x		x	
SNOWY-BROWED FLYCATCHER <i>Ficedula hyperythra</i>	1B, 1C	x							
LITTLE PIED FLYCATCHER <i>Ficedula westermanni</i>	1C	x							
VERDITER FLYCATCHER <i>Eumyias thalassina</i>	2B				x				
SMALL NILTAVA <i>Niltava macgrigoriae</i>	1B		x						
RUFIOUS-BELLIED NILTAVA <i>Niltava sundara</i>	1A, 1B, 1C	x	x			x			
PALE-CHINNED FLYCATCHER <i>Cyornis poliogenys</i>	2A, 2B, 2D				x	x	x		x
PALE BLUE FLYCATCHER <i>Cyornis unicolor</i>	1C	x							
BLUE-THROATED FLYCATCHER <i>Cyornis rubeculoides</i>	1A, 2D								x
PYGMY BLUE FLYCATCHER <i>Muscicapella hodgsoni</i>	1B, 1C, 2A	x	x	x					
GREY-HEADED CANARY FLYCATCHER <i>Culicicapa ceylonensis</i>	1B, 1C, 2A1A, 1B, 1C, 2A, 2C, 3A	x	x			x		x	x
ORIENTAL MAGPIE ROBIN <i>Copsychus saularis</i>	2B, 3A	x			x			x	
WHITE-RUMPED SHAMA <i>Copsychus malabaricus</i>	1B, 1C, 2C	x					x		x
DAURIAN REDSTART <i>Phoenicurus aureus</i>	3A, 3E	x		x					
WHITE-CAPPED WATER REDSTART <i>Chaimarrornis leucocephalus</i>	5	x	x	x	x	x		x	
PLUMBEOUS WATER REDSTART <i>Rhyacornis fuliginosus</i>	5	x	x	x					
LITTLE FORKTAIL <i>Enicurus scouleri</i>	1B		x						
BLACK-BACKED FORKTAIL <i>Enicurus immaculatus</i>	1A, 1B, 1C, 2C, 3D	x			x	x	x	x	
SLATY-BACKED FORKTAIL <i>Enicurus schistaceus</i>	1B, 1C, 2A, 2C, 3E	x	x	x		x			x
WHITE-CROWNED FORKTAIL <i>Enicurus leschenaulti</i>	1A, 1B		x					x	
SPOTTED FORKTAIL <i>Enicurus maculatus</i>	1A, 1B		x	x					x
COMMON STONECHAT <i>Saxicola torquata</i>	3F	x							
GREY BUSHCHAT <i>Saxicola ferrea</i>	4			x					
CHESTNUT-TAILED STARLING <i>Sturnus malabaricus</i>	3A, 3E	x				x		x	
COMMON MYNA <i>Acridotheres tristis</i>	3E					x			
HILL MYNA <i>Gracula religiosa</i>	1A, 1B, 1C, 2B, 3A, 3E	x	x		x	x	x	x	
CHESTNUT-BELLIED NUTHATCH <i>Sitta castanea</i>	1B, 1C, 2C	x	x	x					x
VELVET-FRONTED NUTHATCH <i>Sitta frontalis</i>	1C, 2C, 3A	x							x
BEAUTIFUL NUTHATCH <i>Sitta formosa</i>	1A			x					

Species	Habitat	NP	NA	MO	BL	BR	PA	NG	DA
GREAT TIT <i>Parus major</i>	3A			x					
GREEN-BACKED TIT <i>Parus monticolus</i>	1A, 2A			x					
YELLOW-CHEEKED TIT <i>Parus spilonotus</i>	2A, 3A			x					
YELLOW-BROWED TIT <i>Sylviparus modestus</i>	1A			x					
SULTAN TIT <i>Melanochlora sultanea</i>	1A, 1B, 1C, 2A, 3A	x	x	x		x		x	
BLACK-THROATED TIT <i>Aegithalos concinnus</i>	1A, 2A			x					
BARN SWALLOW <i>Hirundo rustica</i>	5				x				
NEPAL HOUSE MARTIN <i>Delichon nipalensis</i>	5			x					
BLACK-CRESTED BULBUL <i>Pycnonotus melanicterus</i>	1C, 2A, 2C, 2D, 3A	x			x	x		x	x
RED-WHISKERED BULBUL <i>Pycnonotus jocosus</i>	2B, 3	x	x	x	x			x	
RED-VENTED BULBUL <i>Pycnonotus cafer</i>	3	x	x	x	x			x	
WHITE-THROATED BULBUL <i>Alophoixus flaveolus</i>	1A, 1B, 1C, 2A, 2B, 2C	x	x	x	x	x	x	x	x
ASHY BULBUL <i>Hemixos flavala</i>	1A, 1B, 1C, 2B		x	x	x	x			x
MOUNTAIN BULBUL <i>Hypsipetes maclellandii</i>	2A			x					
BLACK BULBUL <i>Hypsipetes leucocephalus</i>	1A, 1B, 2A, 2B			x					x
RUFESCENT PRINIA <i>Prinia rufescens</i>	3B, 3E			x					
GREY-BREASTED PRINIA <i>Prinia hodgsonii</i>	3B, 3E			x					
ORIENTAL WHITE-EYE <i>Zosterops palpebrosus</i>	1C	x						x	
CHESTNUT-HEADED TESIA <i>Tesia castaneocoronata</i>	1A, 1B, 2A		x	x					
SLATY-BELLIED TESIA <i>Tesia olivea</i>	1A, 1B, 1C, 2A, 2C	x	x	x	x			x	x
GREY-BELLIED TESIA <i>Tesia cyaniventer</i>	1A, 1B, 1C, 2A		x	x					
BROWNISH-FLANKED BUSH WARBLER <i>Cettia fortipes</i>	3B, 3E			x					
COMMON TAILORBIRD <i>Orthotomus sutorius</i>	2D, 3A, 3E, 4			x		x	x		
ASHY-THROATED WARBLER <i>Phylloscopus maculipennis</i>	1A, 1B, 2A, 2B		x	x					
LEMON-RUMPED WARBLER <i>Phylloscopus chloronotus</i>	1B, 1C, 2A			x					
YELLOW-VENTED WARBLER <i>Phylloscopus cantator</i>	1A, 1B, 1C, 2A	x	x		x	x			
GOLDEN-SPECTACLED WARBLER <i>Seicercus burkii</i>	1C, 2B, 2D	x			x				
GREY-HOODED WARBLER <i>Seicercus xanthoschistos</i>	1A, 1B, 2A, 2B		x	x					
WHITE-SPECTACLED WARBLER <i>Seicercus affinis</i>	1A, 1B, 1C, 2A	x	x	x					
GREY-CHEEKED WARBLER <i>Seicercus poliogenys</i>	1B, 1C, 2A	x	x	x					
CHESTNUT-CROWNED WARBLER <i>Seicercus castaniceps</i>	1A, 1C, 2A	x	x	x					
RUFOUS-FACED WARBLER <i>Abroscopus albogularis</i>	1A, 1B, 2C		x	x					
BLACK-FACED WARBLER <i>Abroscopus schisticeps</i>	1A			x					
YELLOW-BELLIED WARBLER <i>Abroscopus superciliaris</i>	2C, 2D					x	x	x	x
WHITE-CRESTED LAUGHINGTHRUSH <i>Garrulax leucolophus</i>	1A, 1B, 2A, 2B		x	x			x	x	x
LESSER NECKLACED LAUGHINGTHRUSH <i>Garrulax monileger</i>	1A, 1B, 1C, 2A, 2B, 3A	x	x	x	x	x	x	x	
GREATER NECKLACED LAUGHINGTHRUSH <i>Garrulax pectoralis</i>	1A, 1B, 1C, 2A, 2B, 2C, 3A	x	x	x	x	x		x	x
RUFOUS-NECKED LAUGHINGTHRUSH <i>Garrulax ruficollis</i>	2A, 3A		x	x					
STRIATED LAUGHINGTHRUSH <i>Garrulax striatus</i>	1A			x					
BLUE-WINGED LAUGHINGTHRUSH <i>Garrulax squamatus</i>	2A			x					
ABBOTT’S BABBLER <i>Malacocincla abbotti</i>	1B, 1C, 3C	x			x		x	x	
SPOT-THROATED BABBLER <i>Pellorneum albiventre</i>	1B, 1C	x					x		
PUFF-THROATED BABBLER <i>Pellorneum ruficeps</i>	1C, 2D, 3B	x				x	x		x
LARGE SCIMITAR BABBLER <i>Pomatorhinus hypoleucos</i>	2C							x	
SPOT-BREASTED SCIMITAR BABBLER <i>Pomatorhinus erythrocnemis</i>	1A, 1B, 1C						x	x	
WHITE-BROWED SCIMITAR BABBLER <i>Pomatorhinus schisticeps</i>	1A, 2A			x	x				
STREAK-BREASTED SCIMITAR BABBLER <i>Pomatorhinus ruficollis</i>	2D					x			
RED-BILLED SCIMITAR BABBLER <i>Pomatorhinus ochraceiceps</i>	1B		x						
CORAL-BILLED SCIMITAR BABBLER <i>Pomatorhinus ferruginosus</i>	1B		x						
SCALY-BREASTED WREN BABBLER <i>Pnoepyga albiventer</i>	1C, 2A			x					
PYGMY WREN BABBLER <i>Pnoepyga pusilla</i>	1A, 1B, 2A		x	x					
SPOTTED WREN BABBLER <i>Spelaornis formosus</i>	1A		x						
RUFOUS-FRONTED BABBLER <i>Stachyris rufifrons</i>	2D						x		
RUFOUS-CAPPED BABBLER <i>Stachyris ruficeps</i>	1C, 2D	x							x
GOLDEN BABBLER <i>Stachyris chrysaea</i>	1C, 2A	x		x					
GREY-THROATED BABBLER <i>Stachyris nigriceps</i>	1B, 1C, 2A, 2B, 2C, 3A			x		x	x		x
STRIPED TIT BABBLER <i>Macronous gularis</i>	1B, 1C, 2B, 2C, 2D, 3A	x	x		x	x	x		x
CHESTNUT-CAPPED BABBLER <i>Timalia pileata</i>	3F							x	
SILVER-EARED MESIA <i>Leiothrix argentauris</i>	1A, 1B, 2A, 2B, 3A	x	x	x					
RED-BILLED LEIOTHRIX <i>Leiothrix lutea</i>	1A		x						
CUTIA <i>Cutia nipalensis</i>	2A			x					

Species	Habitat	NP	NA	MO	BL	BR	PA	NG	DA
WHITE-BROWED SHRIKE BABBLER <i>Pteruthius flaviscapis</i>	1A, 2A			x					
BLACK-EARED SHRIKE BABBLER <i>Pteruthius melanotis</i>	1A, 1B		x	x					
WHITE-HOODED BABBLER <i>Gamporhynchus rufulus</i>	1A, 1B, 2C, 2D		x	x		x		x	x
RED-TAILED MINLA <i>Minla ignotincta</i>	1B, 1C		x	x					
YELLOW-THROATED FULVETTA <i>Alcippe cinerea</i>	1A, 2A			x					
RUFIOUS-THROATED FULVETTA <i>Alcippe rufogularis</i>	1A		x						
BROWN-CHEEKED FULVETTA <i>Alcippe poioicephala</i>	2C								x
NEPAL FULVETTA <i>Alcippe nipalensis</i>	1A, 1B, 1C, 2A, 2B, 2C, 2D		x	x	x	x	x		x
STRIATED YUHINA <i>Yuhina castaniceps</i>	1B, 1C, 2A		x	x					x
WHITE-NAPED YUHINA <i>Yuhina bakeri</i>	2A			x					
WHISKERED YUHINA <i>Yuhina flavicollis</i>	2A			x					
RUFIOUS-VENTED YUHINA <i>Yuhina occipitalis</i>	2A			x					
BLACK-CHINNED YUHINA <i>Yuhina nigrimenta</i>	1A, 1B, 2A		x	x					
WHITE-BELLIED YUHINA <i>Yuhina zantholeuca</i>	1A, 1B, 1C, 2C, 2D, 4	x	x	x	x	x	x	x	x
RUFIOUS-BACKED SIBIA <i>Heterophasia annectans</i>	1A, 2A		x	x					
BEAUTIFUL SIBIA <i>Heterophasia pulchella</i>	1A			x					
LONG-TAILED SIBIA <i>Heterophasia picaoides</i>	1A, 1B		x	x					
GREATER RUFIOUS-HEADED PARROTBILL <i>Paradoxornis ruficeps</i>	1C			x					
PLAIN FLOWERPECKER <i>Dicaeum concolor</i>	3D					x			
FIRE-BREASTED FLOWERPECKER <i>Dicaeum ignipectus</i>	1B, 2A		x	x					
SCARLET-BACKED FLOWERPECKER <i>Dicaeum cruentatum</i>	2B, 2C				x				x
RUBY-CHEEKED SUNBIRD <i>Anthreptes singalensis</i>	2B				x				
PURPLE-RUMPED SUNBIRD <i>Nectarinia zeylonica</i>	1A				x				
PURPLE-THROATED SUNBIRD <i>Nectarinia sperata</i>	1C, 2A				x				
PURPLE SUNBIRD <i>Nectarinia asiatica</i>	2B, 3E				x				
GREEN-TAILED SUNBIRD <i>Aethopyga nipalensis</i>	1A			x					
BLACK-THROATED SUNBIRD <i>Aethopyga saturata</i>	1A, 1B, 1C, 2B	x	x	x	x	x			
CRIMSON SUNBIRD <i>Aethopyga siparaja</i>	1B, 1C, 2B	x			x		x		
LITTLE SPIDERHUNTER <i>Arachnothera longirostra</i>	1B, 2B, 3A				x	x	x	x	x
STREAKED SPIDERHUNTER <i>Arachnothera magna</i>	1B, 1C, 2C	x	x					x	x
FOREST WAGTAIL <i>Dendronanthus indicus</i>	1B						x		
WHITE WAGTAIL <i>Motacilla alba</i>	3F	x							
YELLOW WAGTAIL <i>Motacilla flava</i>	3							x	
PADDYFIELD PIPIT <i>Anthus rufulus</i>	3F	x							
OLIVE-BACKED PIPIT <i>Anthus hodgsoni</i>	1B, 1C, 2B	x			x		x		
WHITE-RUMPED MUNIA <i>Lonchura striata</i>	2B, 2D, 3B, 3C			x	x			x	
SCARLET FINCH <i>Haematospiza sipahi</i>	3B			x					
CRESTED BUNTING <i>Melophus lathamii</i>	3B			x					
LITTLE BUNTING <i>Emberiza pusilla</i>	3D			x					
Total		120	107	113	82	67	70	92	58

Key

Sites: NP = Nameri National Park and Pakhui Tiger Reserve; NA = Namdapha Tiger Reserve; MO = Mouling National Park; BL = Balphakram National Park; BR = Barail Reserve Forest; PA = Palak Lake; NG = Ngengpui Wildlife Sanctuary; DA = Dampa Tiger Reserve.

Habitats: 1 = Primary/mature forest: A = Undisturbed to mildly disturbed (largely untouched, occasionally disturbed by hunting or non-timber forest product collection; B = Disturbed (regular cane/palm extraction, heavy non-timber forest product collection, selective logging for local consumption); C = Heavily disturbed (selectively logged for commercial extraction, betel vine plantation, etc.). 2 = Secondary forest (regenerating jhums/abandoned terraced paddy fields): A = Woody regeneration with closed canopy (>15 years old); B = Woody regeneration (5–15 years old); C = Mixed stands with bamboo and trees (generally >20 years old); D = Bamboo (generally monopodial stands, 5–20 years old). 3 = Open habitats: A = Heavily felled/logged (open habitat, often maintained by heavy grazing); B = Recent jhums, abandoned terraced paddy fields (bushy vegetation, <10 years old); C = Current to recently abandoned jhum fallows (<2 years old); D = Current agricultural lands; E = Human habitation and village gardens; F = Riparian grassland (short or tall grassland, often with scattered trees). 4 = Plantations (timber as well as non-timber). 5 = Other (includes aquatic habitats).